

REMARKS

The Office Action dated October 11, 2006, has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto.

Claims 1, 3, 17, 19-22, 24, and 26-30 are currently pending in the application, of which claim 1 is an independent claim. Claims 1 and 3 have been amended to more particularly point out and distinctly claim the invention. No new matter has been added. Claim 31 has been cancelled without prejudice or disclaimer. Claims 1, 3, 17, 19-22, 24, and 26-30 are respectfully submitted for consideration.

A telephone interview was conducted on February 1, 2007, between the Examiner and Applicant's representative. Applicant thanks the Examiner for the courtesies extended to Applicant's representative during the interview. During the interview the various rejections and various ways of rendering the rejections moot were discussed, although agreement was not reached.

The drawings were objected to because they do not show a "drop-like" or "hammer-like" pair of electrodes. Claim 12 illustrating a "drop-like" pair of electrodes has been added. Since it only illustrates previously disclosed content, it does not constitute new matter. "Hammer-like" pairs of electrodes have been omitted from the claims, and, thus, the objection is moot with regard to hammer-like pairs of electrodes. Withdrawal of drawing objections is respectfully requested in view of the amendments.

IN THE DRAWINGS:

Please ADD Figure 12, as shown on the enclosed Replacement Sheet.

Attachment: Replacement Sheet (1) for Figure 12

Claim 31 was rejected under 35 U.S.C. 112, first paragraph, as failing to meet the enablement requirement. Claim 31 has been cancelled without prejudice or disclaimer, and the rejection of claim 31, is moot in consequence of its cancellation.

Claims 1, 3, 17, 19-22, 24, and 26-31 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite because of the phrase “wherein the position of the pair of electrodes is arranged symmetrically” in lines 11-12 of claim 1. It is respectfully submitted that the amendment to claim 1 and the cancellation (without disclaimer or prejudice) of claim 31 renders this rejection moot. Withdrawal of this rejection is respectfully requested.

Claims 1, 24, 26-28, and 30 were rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent Application No. 5,723,790 of Andersson (“Andersson”). Applicant respectfully traverses this rejection.

Claim 1, upon which claims 3, 17, 19-22, 24, and 26-30 depend, is directed to a capacitive acceleration sensor including a pair of electrodes. The pair of electrodes include a movable electrode that is responsive to acceleration, at least one stationary plate portion, and an axis of rotation. The movable electrode is arranged as a torsion beam such that the movable electrode is rigidly supported at the axis of rotation and is free to rotate about the axis of rotation. The capacitive acceleration sensor further includes at least three additional pairs of electrodes. The at least three additional pairs of electrodes are of similar structure to the pair of electrodes. The position of the pairs of electrodes are arranged symmetrically with respect to at least two additional pairs of electrodes.

The at least three additional pairs of electrodes and the pair of electrodes are configured to together provide multi-axis acceleration sensing using capacitive principles. Negative direction vectors of at least four movable electrodes intersect at essentially one point.

Applicant respectfully submits that the Andersson fails to disclose or suggest all of the elements of any of the presently pending claims.

Andersson generally relates to a monocrystalline accelerometer and angular rate sensor. Andersson, as can be seen from column 11, lines 21-34 essentially detects acceleration based on piezoelectric and vibrating gyro principles, not capacitive principles.

Claim 1 recites, "A capacitive acceleration sensor." Andersson does not disclose or suggest a capacitive acceleration sensor, but instead describes sensing acceleration using piezoelectric and vibrating gyro principles. Moreover, lest it be objected that "A capacitive acceleration sensor" is in the preamble, claim 1 also recites, "wherein the at least three additional pairs of electrodes and the pair of electrodes are configured to together provide multi-axis acceleration sensing using capacitive principles." Accordingly, Andersson does not and cannot provide these features of claim 1. Accordingly, Applicant respectfully requests that the rejection be withdrawn.

Furthermore, claim 1 recites, "wherein the movable electrode is arranged as a torsion beam such that the movable electrode is rigidly supported at the axis of rotation and is free to rotate about the axis of rotation." As discussed during the interview, Andersson fails to disclose or suggest at least this feature of claim 1.

Claims 3, 17, 19-22, and 30 were rejected under 35 U.S.C. 103(a) as being unpatentable over Andersson in view of no other reference. Claims 3, 17, 19-22, and 30 are patentable over Andersson for at least the reasons claim 1 is patentable, as discussed above.

Claims 24 and 26-28 were rejected under 35 U.S.C. 103(a) as being unpatentable over Andersson in view of U.S. Patent No. 5,892,154 of Negoro ("Negoro"). The Office Action took the position that Andersson teaches all of the features of the claims except the number of pairs of electrodes. The Office Action cited Negoro to remedy the deficiencies of Andersson. Applicant respectfully traverses this rejection.

Claims 24 and 26-28 depend from and further limit claim 1. At least some of the deficiencies of Andersson with respect to claim 1 are discussed above. Negoro does not remedy these deficiencies, and, thus, the combination of Andersson and Negoro fails to disclose or suggest all of the elements of any of the presently pending claims.

Negoro generally relates to an acceleration detection device. As can be seen from Figure 4 of Negoro, Negoro discloses a capacitive sensor. In the particular embodiment shown in Figure 4, a pair of fixed electrodes 8A and 8B and a pair of moveable electrodes 7A and 7B are provided. As explained at column 9, lines 47-67, in Negoro, as the moveable electrodes 7A and 7B get closer to their respective fixed electrodes 8A and 8B, a corresponding electrostatic capacitance C1 and C2 increases.

The capacitive method of Negoro is non-analogous to and inconsistent with the piezoelectric and vibrating gyro techniques of Andersson. Thus, one of ordinary skill in

the art would not be motivated to combine Andersson and Negoro, because they are non-analogous and from different fields of endeavor. Accordingly, it is respectfully requested that this rejection be withdrawn.

Applicant also notes that if one were to implement Negoro with $n = 8$ electrodes, Negoro would indicate distribution of these on a circle such that $360 \text{ degrees} / n =$ separation of 45 degrees with $n = 8$. Certain embodiments of the present invention, however, provide a different arrangement. As can be seen in Figure 9, for example, there are four positive and four negative vectors of electrodes coinciding in one point. Accordingly, one of ordinary skill in the art would view Negoro as non-analogous to the present application.

Claim 29 was rejected under 35 U.S.C. 103(a) as being unpatentable over Andersson in view of U.S. Patent No. 4,736,629 of Cole ("Cole"). The Office Action took the position that Andersson teaches all of the elements of claim 29 except "measuring different ranges of acceleration." The Office Action cited Cole to remedy this deficiency of Andersson. Applicant respectfully traverses this rejection.

Claim 29 depends from claim 1 and recites additional limitations. At least some of the deficiencies of Andersson with regard to claim 1 are discussed above. Andersson cannot properly be used to show obviousness of the claimed invention, because Andersson is both non-analogous art to the present invention, and because Andersson is non-analogous art to Cole.

Cole generally relates to a micro-miniature accelerometer. As can be seen from Figure 7 and column 8, lines 9-27, of Cole, Cole discloses a capacitive sensor. As Cole explains, variable capacitance CA represents the capacitance between a moveable plate (one of the beams of the embodiments shown in Figures 5 and 6 of Cole) and one of the plates fixed on the substrate, which CB represents the capacitance between the other moveable plate and the other fixed plate. Furthermore, Cole discusses beam formation in a case of two similarly configured electrodes having different beams (148, 150), which measure different accelerations in the same axis, whereas claim 1 recites multi-axis acceleration sensing. This capacitive method is, thus, non-analogous both to the present claims and to the piezoelectric and vibrating gyro techniques of Andersson.

Thus, one of ordinary skill in the art would not be motivated to combine Andersson and Negoro, because they are non-analogous and from different fields of endeavor. Accordingly, Applicant respectfully requests that this rejection be withdrawn.

Claim 31 was rejected under 35 U.S.C. 103(a) as being unpatentable over Andersson in view of U.S. Patent Application No. 5,900,550 of Menzel ("Menzel"). The Office Action took the position that Menzel is evidence that it is well known in the art to optimize the linearity of a capacitive acceleration sensor. Claim 31 has been cancelled without disclaimer or prejudice, and accordingly it is respectfully requested that this rejection be withdrawn.

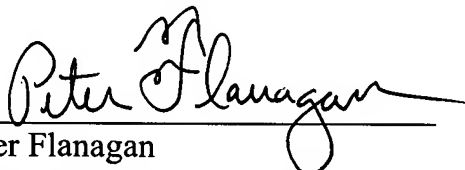
For the reasons explained above, it is respectfully submitted that each of claims 1, 3, 17, 19-22, 24, and 26-30 recites subject matter that is neither disclosed nor suggested

in the cited art. It is, therefore, respectfully requested that all of claims 1, 3, 17, 19-22, 24, and 26-30 be allowed, and that this application be passed to issue.

If, for any reason, the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, Applicant's undersigned attorney at the indicated telephone number to arrange for another interview to expedite the disposition of this application.

In the event this paper is not being timely filed, Applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,



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Enclosures: Petition for Extension of Time
Request for Continued Examination